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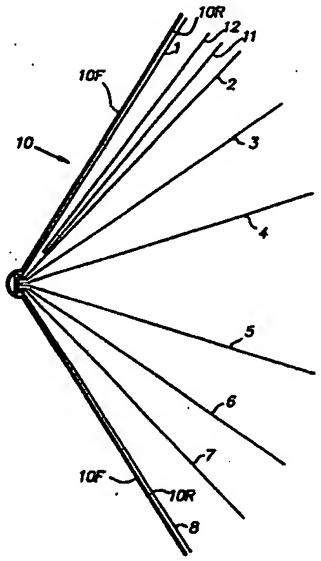

(57) Abstract

A booklet (10) that may serve as a passport comprises a cover (10F, 10R) fixed inwards to a unit of assembled paper foils in booklet form fastened together in their fold by a binding means, characterized in that at least one paper sheet (1-12) of said booklet or at least one cover side (10F, 10R) of said booklet is laminated with a transparent resin sheet bearing an image and/or printed matter which image and/or printed matter is facing said paper sheet (1-12) and is right-reading when inspected through the side of said transparent sheet being remote from the material whereto it is adhered. An embodiment is illustrated in the accompanying drawing.

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DESCRIPTION

PASSPORT BOOKLET

1. Field of the invention.

The present invention relates to a document in the form of a booklet containing identification markings, patterns and/or photograph(s) and to the production of such booklet that may serve as a passport.

2. Background of the invention

Nowadays most of the passports produced all over the world are in the form of a booklet containing alphanumeric data applied by printing and a photograph (portrait) of the person to be identified pasted therein and sometimes covered by a plastic film.

In the production of a passport booklet normally the inner side of the cover and the front side of the first foil are pasted (glued) together. Before said pasting the different foils of the booklet are fixed in the fold, e.g. by stitching. Once said cover and first foil are pasted a try to separate them will result in serious damage of the passport, so that no foils can be replaced without obvious forgery.

A major problem in the production of a tamperproof passport booklet is the way the photograph and printed matter representing identification and verification data are introduced to become a complete part of the booklet not separatable therefrom without destruction or alteration of the verification features, markings and/or identification data.

3. Summary of the invention

It is an object of the present invention to provide a passport booklet in which printed matter and a portrait of the owner of the passport are introduced in such a way that attempts to separate them from the booklet will seriously damage information data and/or

verification features present in said booklet.

It is a further object of the present invention to provide a method for producing a tamperproof passport booklet.

Other objects and advantages of the present invention will appear from the further description.

In accordance with the present invention a booklet that may serve as a passport is provided which comprises a cover fixed inwards to a unit of assembled paper foils in booklet form fastened together in their fold by a binding means, characterized in that at least one paper sheet of said booklet or at least one cover side of said booklet is laminated with a transparent resin sheet bearing an image and/or printed matter which image and/or printed matter is facing said paper sheet and is right-reading when inspected through the side of said transparent sheet being remote from the material whereto it is adhered.

A process according to the present invention for the production of a booklet suited for use as a passport, comprises the steps of :

(1) providing a booklet cover,

(2) providing an assemblage of paper foils which are fastened together in their fold with a binding means, e.g. sewing-thread, forming thereby a booklet of paper sheets,

(3) pasting the first paper sheet of said assemblage to one inner side of said cover and the last paper sheet to the other inner side of said cover, and

(4) laminating at least one inward cover sheet side and/or at least one paper sheet of said booklet to a transparent resin sheet bearing an image and/or printed matter which image and/or printed matter is facing said paper sheet and is right-reading when inspected through the side of said transparent sheet being remote from the material whereto it is adhered.

4. Detailed description of the invention

In a particular embodiment the booklet according to the present invention contains fixed inwards a cover an assemblage of foils that are centrally folded and stitched together with thread in their central fold. In said booklet the centrally folded paper foil

neighbouring the innerside of the cover through the first page sheet is pasted to the innerside of the front cover part, whereas the last page sheet of said paper foil is pasted to the innerside of the back cover part, and the paper sheet adjacent to the paper sheet pasted inwards to said front cover part is laminated with a transparent resin sheet bearing said image and/or printed matter.

Before the lamination step at least the paper sheet laminated to the transparent resin sheet bearing said image and/or printed matter has been provided with verification features and/or markings, e.g. (a) printed guilloche pattern(s) (optionionally in different colours), watermark, perforations, dot screen printed markings, e.g. page numbering visible by optical enlargement, dispersed visible or invisible fibers, metallic thread, etc., that will be damaged in an attempt to separate the laminated elements.

Said embodiment is illustrated in the accompanying drawing in which element 10 represents the cover of a passport booklet, said cover having a front part 10F and a rear part 10R. In the present embodiment the passport booklet contains an assemblage of folded paper foils sewed together by tread (not shown in the drawing) in their common central fold. The folded paper foils represent eight paper sheets numbered 1 to 8.

Paper sheet 1 is pasted to the innerside of the front part 10F of the cover 10 and paper sheet 8 is pasted to the innerside of the rear part 10R of the cover 10. Paper sheet 2 is laminated with its first page side in contact with an adhesive intermediary transparent sheet 11 to a transparent resin sheet 12 carrying an image and printed matter (not shown in the drawing) for identification and/or verification purposes, said image and printed matter being right-reading through the side of said transparent sheet 12 that is remote from said first page side of paper sheet 2.

For clarity's sake the paper sheet 2, the transparent adhesive sheet 11 and the transparent resin sheet 12 are shown still separate before their contact in the lamination step.

In a convenient lamination method the paper sheet to be bond by lamination to said transparent resin sheet carrying the image and other information has been laminated or pasted already in advance at one side to said adhesive sheet.

When a curl problem should occur as a result of single-side lamination of said paper sheet, the lamination or pasting of another resin at the opposite side of said paper sheet will solve the problem by counteracting or balancing the curl-tension built up by the single side lamination.

The transparent resin sheet carrying the image information, e.g. portrait of the owner of the passport, and the printed matter is made preferably of a thin film of clear plastic The plastic may be a natural, modified natural or synthetic film forming resin, e.g. transparent cellulose made from viscose (cellophane), cellulose nitrate or other cellulose ester, (meth)acrylic polymer or copolymer, vinyl polymer or copolymer, e.g. polystyrene, polyethylene, polypropylene or polybutylene, polyester, polycarbonate, polyamide or other film forming resin as described e.g. by D.H. Solomon in the book "The Chemistry of Organic Film Formers", John Wiley & Sons, Inc. New York, London, Sidney (1967).

According to an embodiment said transparent resin sheet has rather poor tensile strength, whereby it becomes easily torn in attempts to separate the laminated parts.

Plastics favoured for use as said transparent resin sheet are cellulose triacetate and cellulose nitrate having preferably a thickness in the range from 10 µm to 250 µm.

Since thin resin sheets are difficult to manipulate in printing and photographic processing these sheets are preferably carried by a relatively thick but flexible temporary support which is stripped away after the lamination step.

According to one embodiment for said purpose a relatively thick temporary support is used coated with an adhesive layer, e.g. pressure-sensitive adhesive layer, wherethrough the temporary support is temporarily laminated with said transparent resin sheet having a stripping layer contacting said adhesive layer and containing at the side opposite said stripping layer the image information and/or printed matter. The stripping layer has poor cohesive strength and is ruptured in peel-apart processing or is not strongly adhering to the adhesive coating of the temporary support, e.g. contains or is made of wax, silicones and/or fluorinated polymer(s) having sufficient abhesive character to allow easy

stripping apart from the adhesive layer remaining with said temporary support.

According to one embodiment said transparent resin sheet carrying an image and/or printed matter is fixed to a paper sheet of said booklet through a self-supporting intermediary resin sheet, e.g. a thermoplastic resin sheet. Through application of pressure and heat followed by cooling said thermoplastic intermediary sheet is fixed at one side by penetration of thermoplastic material in the pores of the selected paper sheet, and at its other side is fixed by physico-chemical affinity of the contacting surfaces to the image-bearing side of said transparent resin sheet carrying the image-information and/or printed matter.

The intermediary self-supporting adhesive hydrophobic resin sheet consists preferably of a resin having a lower glass transition temperature (Tg) and melting temperature (Tm) than the resin present in the image-carrier sheet. According to a preferred embodiment said intermediary sheet is a polyethylene sheet having e.g. a thickness in the range of 10 to 250 micron or is polyethylene terephthalate resin sheet coated at both sides with a resinous melt-adhesive layer, e.g. a polyalkylene layer, preferably polyethylene layer, having a glass transition temperature at least 40°C lower than the glass transition temperature of the resin of the transparent sheet carrying the image-information and printed matter. In this connection reference is made to the Tg values of polyethylene, polypropylene, polyvinyl chloride and polyethylene terephthalate being -20°C, +5°C, +80°C and +67°C respectively (see J.Chem. Educ., Vol. 61, No. 8. August 1984, p. 668).

According to another embodiment the intermediary resin sheet has a core of transparent resin that is coated at one or both sides with an adhesive layer of a pressure, and/or heat, and/or solvent activatable substance or composition. For such kind of adhesive substances reference is made e.g. to US-P 4,033,770 and published European Patent application (EP-A) 0 392 474. Said United States patent relates to a process and material for the production and use of pressure sensitive, and/or heat sensitive and/or solvent sensitive decalcomanias formed according to the principles of the silver complex diffusion transfer process, and said published EP-A

relates to improved surfaces for X-ray intensifying screens wherein a thin, clear, transparent, tough, flexible, dimensionally stable polyamide film is bonded with an adhesive layer to the phosphor-binder layer of said screen.

In a special embodiment the adhesive bond between the image-carrying side of the transparent sheet and the therewith laminated paper sheet is strengthened by curing of the adhesive substance. Curing is a chemical process based on chemical crosslinking of polymer chains and may proceed thermally and/or by radiation, e.g. ultraviolet radiation or electron beam.

Examples of commercially available pressure sensitive adhesives are : ROBOND LEC-58 and ROBOND PS-60 (ROBOND is a tradename of Rohm & Haas, Philadelphia, PA, USA), the tradenamed products being acrylic, water soluble pressure sensitive adhesives,

CARBOSET XPD-1246 (CARBOSET is a tradename of B. F. Goodrich, Cleveland, OH, USA), the tradenamed product being an acrylic, solvent soluble, thermosetting adhesive adhesive,

WHITTAKER 46960 (WHITTAKER is a tradename of Whittaker Corp., W. Alexandria, OH, USA), the tradenamed product being a polyester, solvent soluble adhesive, and

TYCEL 7909/7283 (TYCEL is a tradename Rohm & Haas, Philadelphia, PA, USA), the tradenamed product being a modified aliphatic polyester polyurethane.

In order to avoid premature sticking the adhesive layer(s) is (are) covered with a protective strippable sheet material preventing direct contact with the environment during storage and before contact with other sheets in the lamination. Such protective strippable sheet material being e.g. a siliconised vegetable parchment or glassine paper is described in Research Disclosure March 1977, item 15513 wherein said material serves as temporary support for an image-receiving material that comprises an adhesive layer for securing recorded information to a receptor material used e.g. in the graphic arts in paste-up work.

The printed matter representing identification and/or verification information concerning the passport owner is applied directly onto said transparent resin sheet and/or onto an image-receiving layer carried by said sheet before or after forming a

photographic information, e.g. portrait therein. The printed matter may be readable by the naked eye under visible light conditions or is initially invisible and may become legible e.g. by inspection with heat or ultra-violet light and/or is machine readable.

The printed matter may be applied by any printing technique known in the art, e.g. planographic, gravure, letterpress and silk screen printing using visible and/or invisible inks.

The production of the portrait of the passport owner on said transparent laminatable sheet may proceed by any photographic technique using direct exposure of a photosensitive recording material to an optical image of the person to be identified or by an imaging technique according to which the image is derived from a record containing the image content in non-visible form, e.g. in an electronic or magnetic storage unit or optical memory. The image information contained in said storage unit or memory may be transformed into electronic signals that control a non-impact image printing device, e.g. xerographic laser printer or modulated light emitting diode printer, ink jet or thermographic printer. The principles of non-impact printing and several embodiments thereof are described e.g. in the book "Imaging Processes and Materials" Neblette's eighth Edition - Edited by John Sturge, Viviane Walworth and Allan Shepp - Van Nostrand Reinhold, New York (1989) -Chapter 13.

According to a particular simple and versatile embodiment the portrait is formed photographically by diffusion-transfer-reversal (DTR) processing using a transparent resin sheet containing an image-receiving layer adapted to form therein a black-and-white silver image or colour image built up by image-wise diffusion transfer of dyes from an image-wise photo-exposed and developed photographgic material.

The black-and-white diffusion transfer process known as silver halide complex diffusion transfer process and several embodiments of the colour diffusion transfer process are described in chapter 6 of the above mentioned book Neblette's eighth Edition. For embodiments of the silver halide diffusion transfer process further reference is made to the book : "Photographic Silver Halide Diffusion Processes" by André Rott and Edith Weyde - Focal Press - London - New York

(1972. A survey of dye diffusion transfer materials is given in the periodical Research Disclosure, November 1976, item 15162 and in the periodical Angewandte Chemie, Vol 22, No. 3, March 1983, pages 191-209 International Edition in English.

A common image-receiving layer suited for carrying out the silver complex diffusion transfer process contains physical development nuclei in a hydrophilic binder. The physical development nuclei promote the reduction into metallic silver of the silver halide complexes transferred from the developed photographic material (ref.the already mentioned book of A. Rott and E. Weyde p. 54-57). Preferred nuclei are e.g. colloidal silver and heavy metal sulphide nuclei such as palladium sulphide, nickel sulphide and silver-nickel sulphide nuclei.

According to a preferred embodiment the printing with ink of the desired markings and/or alphanumeric characters proceeds on an image-receiving layer suited for forming therein a silver image by the silver halide complex diffusion transfer method. The printing matter, i.e. ink, covers then said image-receiving layer in such a way that the physical development nuclei are shielded and inhibited to play their role in the formation of the silver image. Operating that way fine printed lines and/or spots will appear lateron in the photographically formed image (portrait and other photographically produced information) and form an additional verification feature.

According to a particular embodiment the nuclei containing layer is coated with a nuclei-free toplayer and is present on a nuclei-free underlying hydrophilic colloid undercoat layer or undercoat layer system as described in published European patent application (EP-A) 0 306 561.

The undercoat optionally incorporates substances that improve the image quality, e.g. incorporates a substance improving the image-tone or the whiteness of the image background. For example, the undercoat may contain a fluorescent substance, silver complexing agent(s) and/or development inhibitor releasing compounds known for improving image sharpness.

According to a special embodiment the image-receiving layer is applied on an undercoat playing the role of a timing layer in association with an acidic layer serving for the neutralization of

alkali of the image-receiving layer. By the timing layer the time before neutralization occurs is established, at least in part, by the time it takes for the alkaline processing composition to penetrate through the timing layer. Materials suitable for neutralizing layers and timing layers are disclosed in Research Disclosure July 1974, item 12331 and July 1975, item 13525.

In the image-receiving layer and/or in said toplayer and/or in an undercoat gelatin is used preferably as hydrophilic colloid.

In said layers gelatin is present preferably for at least 60 % by weight and is optionally used in conjunction with an other hydrophilic colloid, e.g. polyvinyl alcohol, cellulose derivatives, preferably carboxymethyl cellulose, dextran, gallactomannans, alginic acid derivatives, e.g. alginic acid sodium salt and/or watersoluble polyacrylamides. Said other hydrophilic colloid may be used also in the top layer for at most 10 % by weight and in the undercoat in an amount lower than the gelatin content.

The image-receiving layer and/or a hydrophilic colloid layer in water-permeable relationship therewith may comprise a silver halide developing agent and/or silver halide solvent, e.g. sodium thiosulphate in an amount of approximately 0.1 g to approximately 4 g per m^2.

The image-receiving layer or a hydrophilic colloid layer in water-permeable relationship therewith may comprise colloidal silica.

In at least one of the layers of the image-receiving material substances can be contained which play a role in the determination of the colour tone of the diffusion transfer silver image. Substances providing a neutral colour tone are called black-toning agents, e.g. as described in GB A 561,875 and BE A 502,525.

The image-receiving layer may contain as physical development accelerators, in operative contact with the developing nuclei, thioether compounds such as those described e.g. in DE A 1,124,354; US A 4,013,471; US A 4,072,526; and in EU A 0,026,520.

When an optical brightening agent is present in the image-receiving material preference is given to an optical brightening agent that is inherently resistant to diffusion or is made resistant to diffusion by use in conjunction with another

substance wherein it is dissolved or whereto it is adsorbed as described in published EP-A 0 306 561.

Photographic silver halide emulsion layer materials for use in conjunction with said image-receiving material containing development nuclei or image-wise releasable dyes may be of any kind useful in the art of diffusion transfer processing but for continuous tone reproduction are preferably of the type yielding fairly soft contrast images as described e.g. in US-P 3,985,561 and 4,242,436.

According to a preferred embodiment in the production of a passport booklet of the present invention wherein a paper sheet of the booklet is laminated to a hydrophilic colloid layer containing an image on said transparent resin sheet, said hydrophilic colloid layer before bonding by lamination with an adhesive hydrophobic intermediate sheet is coated with an aqueous solution improving the wet strength and the adherence affinity of said hydrophilic colloid layer or assemblage towards the hydrophobic resin material of the intermediary sheet.

A substance improving the wet-strength of hydrophilic colloid containing layers such as developed silver halide emulsion layers and diffusion transfer reversal (DTR) image-receiving layers containing such colloid is a poly-1,2-alkyleneimine described in US-P 4,456,667.

A preferred wet-strength and adherence improving substance is the condensation product of a polyalkylenepolyamine containing at least two primary amino groups and at least one secondary or tertiary amino group with a dicarboxylic acid which condensation product being a polyamidoamine has been grafted by reaction with an alkene-1,2-imine in the presence of an acid catalyst, and has been transformed into a cationic crosslinked polymer by allowing to react the obtained grafted polymer with a bifunctional crosslinking agent being an epihalohydrin or an Alpha-Omega-dihalohydrinether or the ether compound obtained by reaction of epichlorohydrin with a watersoluble polyalkyleneoxide.

The coating of said wet-strength and adherence improving condensation product after image-formation in the image-receiving layer proceeds preferably at a dry solids coverage in the range of

0.2 g/m2 to 15 g/m2.

The coating proceeds by common coating apparatus known in the art, e.g. by dipping, spraying, doctor blade coating, roller coating, meniscus coating and the like.

The coating takes place preferably at room temperature (20 °C) with the treating liquid having a pH in the range of 4 to 10, whereupon the coated layer is dried to remove the water.

The preparation of the above defined cationic crosslinked polymer is described in published French patent application 2 020 415 and published German patent application (DE-OS) 3 316 179, wherein said polymer is described for use in the preparation of paper as flocculation agent and retention agent for pigments.

In the preparation of said polyamidoamine compounds used as starting compounds in the synthesis of said cationic crosslinked polymer preferably dicarboxylic acids containing 4 to 10 carbon atoms are made to react with polyalkylenepolyamines that contain 3 to 10 basic nitrogen atoms in their molecule and at least two primary amino groups.

Examples of suitable dicarboxylic acids for producing said polyamideamines are saturated aliphatic C_4-C_{10}-dicarboxylic acids including their anhydrides and esters capable of reaction with primary amines.

Preferred acids for use in the production of said polyamideamines are succinic acid, maleic acid, adipic acid, (hexanedioic acid), glutaric acid, diglycollic acid and sebacic acid or their functional derivatives, such as anhydrides or esters.

Examples of suitable polyalkylenepolyamines are diethylenetriamine, triethylenetetramine, tetraethylenepentamine, dipropylenetriamine, tripropylenetetramin and dihexamethylenetriamine.

In the preparation of said polyamidoamine compounds per mole of dicarboxylic acid or derivative 0.8 to 1.4 mole of polyalkylenepolyamine are used preferably.

The polyamidoamines obtain already a cationic character in the graft reaction with ethyleneimine in the presence of an acid catalyst, e.g. sulphuric acid or p-tolusulphonic acid. In the graft reaction preferably 20 to 400 parts by weight, more preferably 50 to

300 parts by weight, of ethene-1,2-imine (i.e. ethyleneimine) with respect to 100 parts by weight of the polyamidoamine are used.

Examples of epihalohydrins and Alpha-dihalohydrins serving as difunctional crosslinking agents for application in the preparation of said cationic crosslinked polymer are epibromohydrin, Alpha-dibromohydrin, epichlorohydrin and Alpha-dichlorohydrin.

Other useful difunctional crosslinking agents are the ether compounds obtained by reaction of epichlorohydrin with watersoluble polyalkyleneoxides. Examples thereof are the addition products of ethylenoxide and glycol or water, wherein e.g. per mole of glycol 8 to 100 mole of ethyleneoxide are used in the addition reaction. The still watersoluble polyalkyleneoxides are then with their OH-end groups allowed to react with equivalent amounts of epichlorohydrin so that hereby Alpha, Omega-dichlorohydrin ether compounds serving as bifunctional crosslinking agents are formed.

A preferred cationic crosslinked polymer for use according to the present invention, called hereinafter "cationic crosslinked polymer P", is the reaction product obtained according to Example 1 of published French patent application 2,020,415. In the preparation of said polymer first a polyamidoamine has been formed by reaction of diethylenetriamine and adipic acid. The obtained polyamidoamine has been grafted with ethyleneimine in the presence of p-tolusulfonic acid. Thereupon the grafted polymer has been crosslinked with epichlorohydrine to obtain a watersoluble cationic crosslinked polymer. A 15 % by weight aqueous solution of the obtained polymer has a viscosity of 160 cP at 25 °C.

With the above defined cationic crosslinked polymer particularly strong adhesion between a hydrophobic resin foil such as a polyethylene foil and a hydrophilic colloid layer containing a diffusion resistant cationic mordant can be obtained.

During the coating and lamination the above defined cationic crosslinked polymer penetrates into the hydrophilic colloid image-receiving layer containing the information to be protected and makes a very firm bond therewith and gives after drying in the lamination a good adherence towards a hydrophobic resin surface such as polyethylene resin surface.

Cationic polymeric mordants are used in the production of dye

images obtained by a dye diffusion transfer process wherein anionic dyes are transferred from the photographic developed silver halide emulsion material into the image-receiving material.

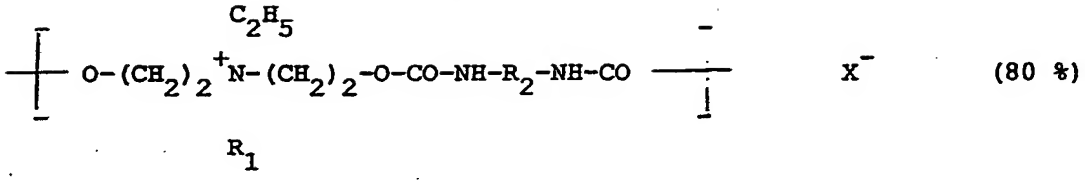
The image-wise diffusion of the anionic dyes is controlled by the development of one or more image-wise exposed silver halide emulsion layers, that for the production of a multicolour image are differently spectrally sensitized and contain respectively a yellow, magenta and cyan dye molecules. A survey of dye diffusion transfer processes wherein anionic dyes are released image-wise is given by Christian C. Van de Sande in Angew. Chem. - Ed. Engl. 22 (1983), No. 3, pages 191-209.

Particularly suitable mordants for anionic dyes are long-chain quaternary ammonium or phosphonium compounds or ternary sulphonium compounds, e.g. those described in US-P 3,271,147 and 3,271,148, such as cetyltrimethyl-ammonium bromide, and polymeric cationic mordants.

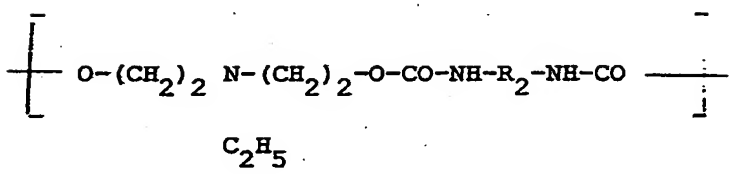
In US-P 4,186,014 cationic polymeric mordants are described that are particularly suited for fixing anionic dyes such as sulphinic acid salt dyes that are image-wise released by a redox-reaction described e.g. in published EP-A 0,004,399 and US-P 4,232,107. Said cationic polymeric mordants contain glycidyl groups that can react with active hydrogen atoms present in gelatin serving as binding agent. Such polymers can be made by quaternizing a basic polyurethane, polyurea or polyurea-polyurethane with a quaternizing agent capable of introducing glycidyl groups. According to said US-P specification the mordant layer acting as dye-image receiving layer contains preferably said cationic polymeric mordant in quantities of from 10 to 70 % by weight based on the total solids content of the mordant layer.

Other particularly suitable cationic polymeric mordants are polyvinylimidazole compounds wherein at least part of the imidazole nuclei is in salt and/or quaternized form. A general formula of said polymeric mordants and a specific Example thereof (identified as Beizmittel B) are described in Research Disclosure August 1982, item 22040.

A particularly suited cationic polymeric mordant, called hereinafter "mordant M" has the following composition :



(80 %)



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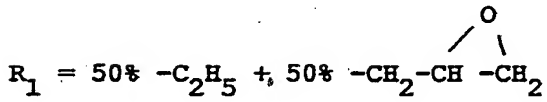
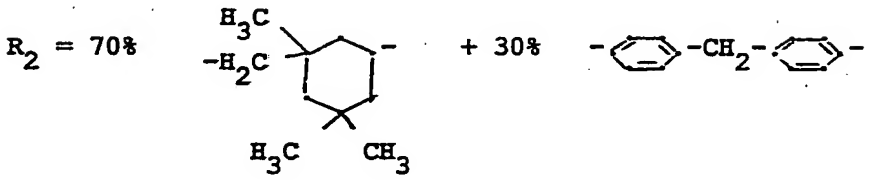




$X^- = 50\ \%\ C_2H_5SO_4^- + 50\%\ Cl^-$

As described in published European patent application 0 309 618 a particularly suited dye image receiving layer for use in the production of laminates contains a hydrophobic resin support coated with a subbing layer that is coated with an image-receiving layer containing gelatin in combination with a cationic polymeric mordant containing glycidyl groups that can react with active hydrogen atoms of gelatin, wherein the weight ratio of said polymeric mordant to gelatin in said image-receiving layer is between 25:1 to 1:1 and the gelatin is present therein at a coverage of at least 0.1 g per m^2. Said subbing layer has been applied from an aqueous composition comprising a polyester-polyurethane wherein isocyanate groups still present in its structure have reacted with an ionomeric compound containing at least one active hydrogen atom and a carboxylate or sulphonate salt group forming an anionic polyester-polyurethane.

The preparation of said anionic polyester-polyurethanes is described in US-P 3,397,989 and US-P 4,388,403.

The quantity of salt groups in said anionic polymers is sufficient to make the anionic polyester-polyurethane dispersable in aqueous medium or in aqueous medium optionally mixed with a water-miscible solvent.

Preferably the sulfonate and/or carboxylate groups total from 0.5 to 15 % by weight with respect to the anionic polyester-polyurethane.

The polyester-polyurethane used as starting compound in the reaction with said ionomeric compound is preferably a polyurethane of an essentially linear polyester compound that has two terminal hydroxyl groups, the polyester having preferably a molecular weight of about 300 to about 20,000.

Preferred anionic polyester-polyurethanes for use as subbing materials in the production of a laminated product according to the present invention contain linear polyester structural parts corresponding with a polyester derived from a dicarboxylic acid containing up to 6 carbon atoms and a polyhydric aliphatic alcohol containing up to 6 carbon atoms.

In said subbing layer gelatin may be present in the range of 0 % to 25 % by weight with respect to the anionic polyester-polyurethane.

An anionic polyester-polyurethane that is particularly suited for use in a subbing layer on a polyvinyl chloride resin support, either or not in combination with gelatin, is called herein "Subbing ingredient S" and is the reaction product of :

(1) the polyester of adipic acid and hexanediol with average molecular weight 840, (23 %),

(2) 4,4'-diisocyanato-dicyclohexylmethane (14 %),

(3) dimethylolpropionic acid (2 %),

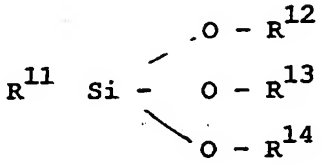
(4) trimethylamine (1.5 %),

the given percentages are by weight.

Subbing ingredient S is used as a dispersion in water containing 7.5 % by weight of N-methylpyrrolidinone.

The subbing layer composition preferably also contains a siloxane compound. Preferred siloxane compounds for use according

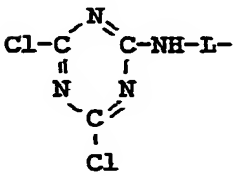
to the present invention are within the scope of the following general formula :



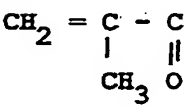
wherein :
R^{11} represents a chemical group capable of a polymerization reaction or reactive with respect to amino and/or hydroxyl groups present in proteinaceous material such as gelatin and caseine, more particularly is a group containing reactive halogen such as a reactive chlorine atom, an epoxy group or an alpha,beta-ethylenically unsaturated group, representatives of such groups being e.g. the following :

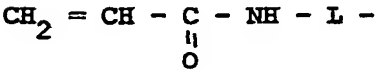
$Cl - CH_2 - CO - NH - L -$

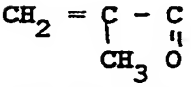
$Br - CH_2 - CO - NH - L -$



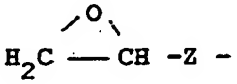
$CH_2=CH-SO_2-CH_2-O-CH_2-SO_2-CH_2-NH-L-$







wherein L represents an alkylene group preferably a C_1-C_4 alkylene group, or
R^{11} represents the group :

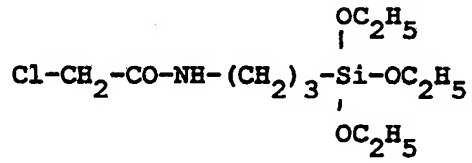


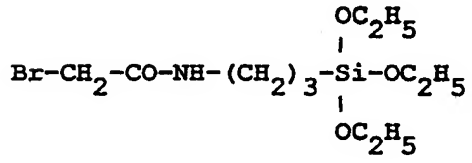
wherein Z is a bivalent hydrocarbon chain including such chain interrupted by oxygen, e.g. is a $-CH_2-O(CH_2)_3-$ group, or a bivalent hydrocarbon group that is linked at the side of the silicon atom to oxygen, e.g. is a $-CH_2-O-$ group, and
each of R^{12}, R^{13} and R^{14} (same or different) represents a hydrocarbon group including a substituted hydrocarbon group e.g. methyl and ethyl.

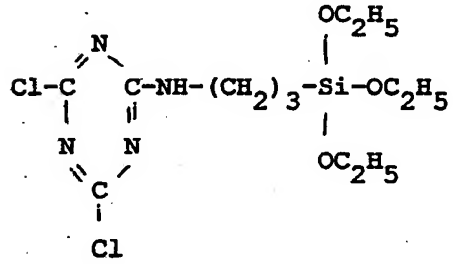
Siloxane compounds according to the above general formula are described in US-P 3,661,584 and GB-P 1,286,467 as compounds improving the adherence of proteinaceous colloid compositions to glass.

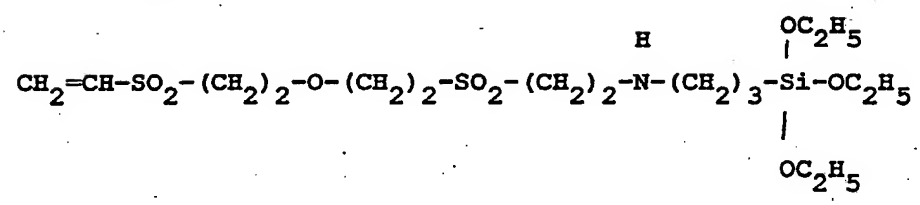
Examples of particularly useful siloxane compounds are listed in the following table 1.

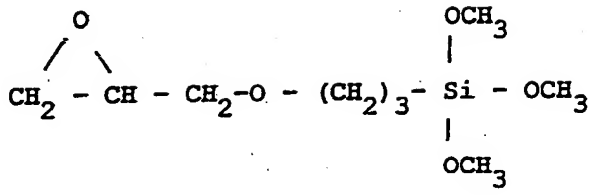
TABLE 1

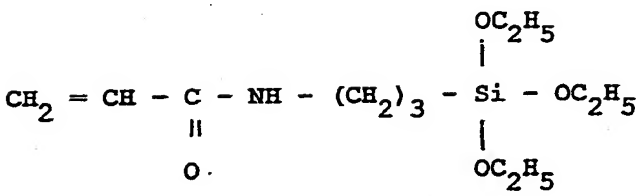
1. 

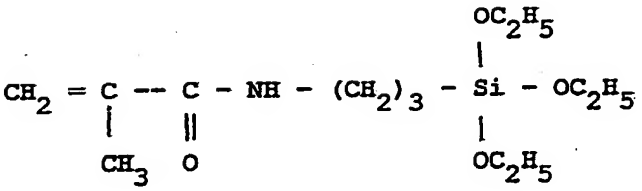
2. 

3. 

4. 

5. 

6. 

7. 

The siloxane compounds are preferably used in a ratio by weight with respect to the anionic polyester-polyurethane in the range from 0 : 1 to 0.15 : 1.

Hydrophobic resin supports whereto said subbing layer provides a good anchorage for a mordant layer as defined above are made of e.g. polyester resin, polycarbonates of bis-phenols, polyolefins, e.g. polyethylene and polypropylene, polystyrene or a vinyl chloride polymer. The latter polymer is particularly suited for forming laminates by heat-sealing.

The dye image receiving layer may contain ultraviolet-absorbing substances to protect the mordanted dye images from fading.

For preventing discolouration of the dye image and staining of the image-background by the heat applied in the lamination step the hydrophilic colloid composition of the photographic laminate contains iodide ions, preferably applied in the form of potassium iodide, as described in published EP-A 0 250 657.

The production of colour photographs by the dye diffusion transfer process is a very convenient method especially for the production of a colour photograph of the person to be identified.

The resin support sheet whereon the hydrophilic colloid layer(s)

containing the information to be protected is (are) coated has preferably a thickness in the range of 0.050 to 0.75 mm for allowing its manipulation in a mechanical printing process, e.g. offset or intaglio printing.

Before or after being coated with the necessary hydrophilic colloid layer(s) for imaging purposes the transparent resin support can receive itself or on said layer(s) security or verification marks in the form of e.g. a finger print, printed patterns known from bank notes, e.g. guilloches, coded information, e.g. binary code information, liquid crystals as described e.g. in published European patent application 0 400 220, signature or other printed personal data or marks that may be applied with fluorescent pigments, nacreous pigments giving special light-reflection effects as described e.g. in US-P 4,151,666, and/or visibly legible or ultraviolet-legible printing inks as described e.g. in GB-P 1,518,946 and US-P 4,105,333. The printing inks may contain dyes that diffuse partly (e.g. by heat applied applied in the lamination step) into the paper sheet and become physically or chemically fixed therein.

As already mentioned above the paper sheet whereto the transparent image-bearing resin sheet is laminated may contain itself printed matter and a large variety of verification features that will be altered or destroyed when parts of the laminate are mechanically or chemically separated.

Other possibilities to increase security against counterfeiting are the inclusion in the laminate (on the paper and/or laminated transparent resin sheet) of a fugitive ink pattern that becomes leached out or blurred by contact with moisture if one should succeed in opening the laminate by a wet treatment.

Further security features are infrared-absorbing markings, mildly radioactive isotope patterns, magnetic dots or strips and electronic microcircuits hidden from visibility, and holograms as described, e.g., in DE-OS 2 639 952, GB-P 1,502,460 and 1,572,442 and US-P 3,668,795. The holographic patterns may be obtained in silver halide emulsion layers, normally Lippmann emulsions, especially designed for that purpose and can either or not be combined with a photograph.

According to a preferred embodiment the silver halide emulsion layer for producing the hologram is applied to the side of the transparent resin that is laminated in contact with a paper sheet or cover side of the passport booklet.

The lamination in the passport booklet of the transparent resin sheet containing an image when proceeding through the intermediary of a thermoplastic resin sheet having a softening point below 60 °C is carried out advantageously between flat plates of a pressure laminator of which one or both of the plates are heated. A temperature of about 80 to 140 °C under a moderate pressure e.g. in the range of 0.5 to 1.5 kg/cm^2, keeping the elements to be laminated in pressure contact for a period of about 10 seconds gives satisfying results of tamperproof bonding. A preferred heat-laminating apparatus operating with plates and rollerpairs for pass-through lamination is described in published EP 0 457 385.

According to another embodiment a roll-laminator known in the art is used. The lamination may proceed by putting the whole booklet containing the elements to be laminated between the pressure-exerting elements of the laminator, but in another embodiment the paper foil, for bonding thereto the transparent resin sheet containing a portrait and printed mattter, before being folded and assembled by binding is introduced in contact with said sheet into the laminator for effecting the desired bonding to the selected paper page of the lateron to be assembled passport booklet.

Suitable roll-laminators for continuous heat-laminating are described e.g. in published UK patent applications 2 094 709 and 2 094 711.

Optionally the laminated transparent image-containing resin sheet may be laminated with a topcoat to improve or reduce its permeability to water, so that the process of laminating may be carried out at one or both sides of the information carrier.

The following example illustrates the present invention without, however, limiting it thereto.

All parts, ratios and percentages are by weight unless otherwise stated.

EXAMPLE

A transparent sheet of cellulose triacetate having a thickness of 100 µm was coated at one side with the following subbing coating composition expressed in g/m^2 for each side :

Ingredient A	2.0
Ingredient B	0.2

The subbing layer was coated with a mordant layer composition expressed in g/m^2 for each side :

Ingredient C	2.25
Ingredient D	5.35

"Ingredient A" is the polyester-urethane "subbing ingredient S" the composition of which has been defined hereinbefore.

"Ingredient C" is the "mordant M" as described hereinbefore.

"Ingredients B and D" are gelatin.

The aqueous coating composition of the subbing layer contained a common spreading agent and siloxane compound No. 6 in an amount of 6.25 % with respect to ingredient A and was introduced as a 5 % solution in ethanol.

The above image receiving sheet was dye diffusion image transfer processed with a portrait photo-exposed photographic dye diffusion transfer material having a composition as described in the Example of US-P 4,496,645. The exposure proceeded optically in such a way that a reverse reading image (mirror image of the portrait) was obtained in the image-receiving layer when seen in the direction of the image-receiving layer but right reading when seen through the rear side of the transparent cellulosetriacetate support.

Following said photo-exposure said photographic material was wetted in a first tray of a COPYPROOF CP 38 (trade name of Agfa-Gevaert N.V. Belgium) diffusion transfer processing apparatus with a basic processing liquid of the following composition :

sodium hydroxide	25 g
sodium orthophosphate	25 g
cyclohexane dimethanol	25 g
2,2'-methylpropylpropane diol	25 g

N-ethylbenzene-pyridinium chloride	0.5 g
distilled water up to	1000 ml

After being wetted each sheet was contacted with a different side of the dye image receiving sheet material and kept in contact therewith for 1 minute, whereupon the sheets were separated.

After separation the dye image receiving sheet material was led through a second tray containing plain water as rinsing liquid.

Thereupon the thus treated dye image receiving sheet was dip coated with an adhesive coating being applied from an aqueous 15 % solution of cationic crosslinked polymer P defined hereinbefore. The dry coverage of said polymer P was 2 g/m^2.

After drying the thus coated sheet was arrranged in a laminate assemblage containing a passport booklet paper sheet and intermediate polyethylene sheet having a thickness of 100 µm making at one side contact with the paper sheet and at the opposite side with the imaged side of the image-receiving sheet which contains a reverse reading image when seen from the side of the polyethylene sheet.

The lamination was carried out in a pass-through roller pair laminator pressing successive areas of the elements to be laminated together for 10 seconds using a pressure of 0.5 kg/cm^2 at a temperature of 110 °C.

The obtained laminate has a sealing thus strong that even in wet state peeling apart of the cellulose triacetate sheet is no longer possible without tearing apart parts of the paper whereto the lamination took place.

CLAIMS

1. A booklet that may serve as a passport comprises a cover fixed inwards to a unit of assembled paper foils in booklet form fastened together in their fold by a binding means, characterized in that at least one paper sheet of said booklet or at least one cover side of said booklet is laminated with a transparent resin sheet bearing an image and/or printed matter which image and/or printed matter is facing said paper sheet and is right-reading when inspected through the side of said transparent sheet being remote from the material whereto it is adhered.

2. Booklet according to claim 1, wherein said booklet contains fixed inwards said cover an assemblage of foils that are centrally folded and stitched together with thread in their central fold, an wherein the centrally folded paper foil neighbouring the innerside of the cover through the first page sheet is pasted to the innerside of the front cover part, whereas the last page sheet of said paper foil is pasted to the innerside of the back cover part.

3. Booklet according to claim 1 or 2, wherein at least the paper sheet laminated to the transparent resin sheet bearing said image and/or printed matter has been provided with verification features and/or markings.

4. Booklet according to any of claims 2 or 3, wherein the paper sheet adjacent to the paper sheet pasted to said front cover part is laminated with said transparent resin sheet bearing said image and/or printed matter.

5. Booklet according to any of claims 1 to 4, wherein said transparent resin sheet bearing said image and/or printed matter is a made of clear plastic being a natural, modified natural or synthetic film forming resin, said sheet having a thickness in the range from 10 µm to 250 µm.

6. Booklet according to any of claims 1 to 5, wherein said transparent resin sheet is a cellulose triacetate or cellulose nitrate sheet.

7. Booklet according to any of the preceding claims, wherein said transparent resin sheet difficult to manipulate in printing and photographic processing is carried by a relatively thick but flexible temporary support which is stripped away after said transparent resin sheet is fixed by lamination to said paper sheet.

8. Booklet according to any of the preceding claims, wherein said transparent sheet carrying an image and/or printed matter is fixed to a paper sheet of said booklet through an intermediary resin sheet.

9. Booklet according to claim 8, wherein said intermediary resin sheet is a thermoplastic resin sheet which at one side is fixed to said paper sheet by penetrating in the paper pores by pressure and heat, and at the image-bearing side of said transparent resin sheet is adhered to said intermediary resin sheet by physico-chemical affinity of the contacting surfaces.

10. Booklet according to any of the preceding claims, wherein the printed matter representing identification and/or verification information concerning the passport owner has been applied directly onto said transparent resin sheet and/or onto an image-receiving layer carried by said resin sheet before forming an image therein.

11. Booklet according to any of the preceding claims, wherein at least part of said image is formed photographically by diffusion-transfer-reversal (DTR) processing using a transparent resin sheet containing an image-receiving layer adapted to form therein a black-and-white silver image or colour image built up by image-wise diffusion transfer of image-wise released dyes from an image-wise photo-exposed and developed photographic silver halide emulsion layer material.

12. A process for the production of a booklet suited for use as a passport, which process comprises the steps of :

(1) providing a booklet cover,

(2) providing an assemblage of paper foils which are fastened together in their fold with a binding means, e.g. sewing-thread, forming thereby a booklet of paper sheets,

(3) pasting the first paper sheet of said assemblage to one inner side of said cover and the last paper sheet to the other inner side of said cover, and

(4) laminating at least one inward cover sheet side and/or at least one paper sheet of said booklet to a transparent resin sheet bearing an image and/or printed matter which image and/or printed matter is facing said paper sheet and is right-reading when inspected through the side of said transparent sheet being remote from the material whereto it is adhered.

13. Process according to claim 12, wherein the printed matter representing identification and/or verification information concerning the passport owner has been applied directly onto said transparent resin sheet or onto an image-receiving layer carried by said resin sheet before forming an image therein.

14. Process according to claim 12 or 13, wherein said image has been formed by any direct photographic technique or imaging technique in which the image is derived from a record containing the image content in non-visible form, said record being selected from the group consisting of an electronic storage unit, magnetic storage unit and optical memory unit.

15. Process according to any of the claims 12 to 14, wherein at least part of said image is formed by a non-impact image printing device selected from the group consisting of a xerographic laser printer, modulated light-emitting diode printer, ink jet and thermographic printer or at least part of said image is formed photographically by diffusion-transfer-reversal (DTR) processing using a transparent resin sheet containing an image-receiving layer adapted to form therein a black-and-white silver image or colour

image built up by image-wise diffusion transfer of image-wise releasable dyes from an image-wise photo-exposed and developed photographgic silver halide emulsion layer material.

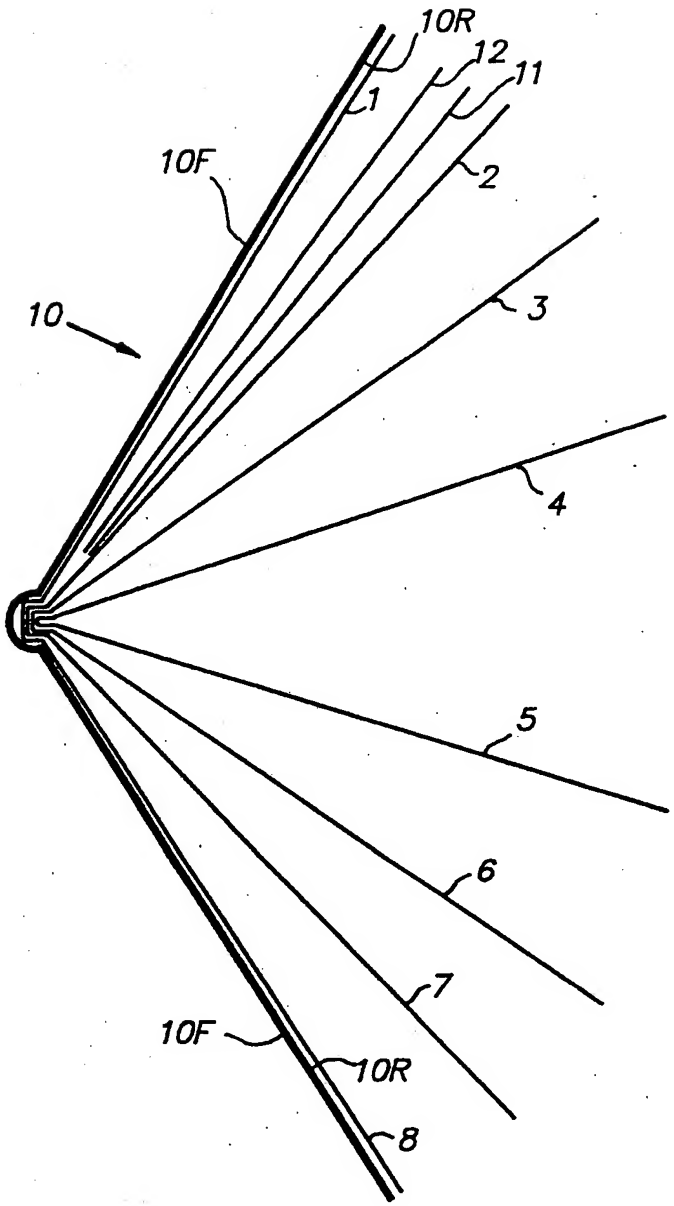


FIG. 1

INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 92/02997

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B42D15/10

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B42D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 058 (M-0930)2 February 1990 & JP,A,01 283 191 (KONICA) 14 November 1989 see abstract	1-6,12
X	PATENT ABSTRACTS OF JAPAN vol. 015, no. 097 (M-1090)8 March 1991 & JP,A,02 310 095 (TOSHIBA) see abstract	1
X	NL,A,8 603 279 (PAPIER-PLASTIC-COATING GRONINGEN) 18 July 1988 see page 2, line 26 - line 30; figure 1	1

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° Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
08 APRIL 1993	24. 05. 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	EVANS A.J.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 060 (M-0931)5 February 1990 & JP,A,01 285 390 (KONICA) 16 November 1989 see abstract	1

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

EP 9202997
SA 68652

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 08/04/93

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NL-A-8603279	18-07-88	None	